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TAGGING AND RECAPTURE ACTIVITIES CARRIED OUT BY THE SPANISH CONFEDERATION OF RESPONSIBLE RECREATIONAL FISHING (CEPRR) WITH THE SCIENTIFIC COORDINATION OF THE SPANISH INSTITUTE OF OCEANOGRAPHY (IEO) IN THE MEDITERRANEAN (2008-2011)

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SUMMARY

During the 2008-2011 period, 1548 specimens of tuna and tuna-like species were tagged by the Spanish Confederation of Responsible Recreational Fishing (CEPRR) with the scientific coordination of the Spanish Institute of Oceanography (IEO). Of these, 1031 bluefin tuna were tagged with conventional tags, whereas 10 other specimens of the same species were tagged with pop-up satellite electronic tags in the Mediterranean. Five pop-up electronic tags remained on the adult specimens up to 110 days. In this period, the specimens stayed in the tagging area except for one of them, which reached Algerian waters in the winter. Similarly, 333 long-finned tuna and up to 184 specimens belonging to other species such as swordfish, little tunny, bonito, frigate tuna and spearfish, were also tagged. Eight bluefin tuna were recaptured, including one adult tuna which was found in the same area where it was tagged (Balearic Islands) 1343 days after release. A juvenile tuna tagged in the Mediterranean was recaptured more than two years after release in the Cantabrian Sea. Over the 2008-2011 period, the IEO provided a number of training courses on conventional and electronic tagging techniques at the different ports where tournaments and/or tagging and release campaigns were carried out. This promoted participation of the CEPRR in the tagging design of the GBYP-ICCAT Atlantic-wide Research Programme on Bluefin Tuna, as well as strategic and scientific interest.

RÉSUMÉ

Entre 2008 et 2011, 1.548 spécimens de thonidés et d'espèces voisines ont été marqués par la Confédération espagnole de pêche récréative responsable (CEPRR), avec la coordination scientifique de l'Institut espagnol d'océanographie (IEO). Sur cette quantité, 1.031 thons rouges ont été marqués avec des marques conventionnelles et 10 autres exemplaires de la même espèce ont été marqués avec des marques électroniques de type «pop-up» reliées par satellite en Méditerranée. Cinq marques électroniques pop-up ont été apposées sur des spécimens adultes pendant un maximum de 110 jours. Au cours de cette période, les spécimens sont restés dans la zone de marquage, exception faite d'un spécimen qui a atteint, en hiver, les eaux algériennes. On a ainsi procédé au marquage de 333 germons et à un maximum de 184 spécimens d'autres espèces, telles que l'espadon, la thonine commune, la bonite à dos rayé, le bonitou et le marlin de la Méditerranée. Huit thons rouges ont été récupérés, dont trois adultes dans la même zone où ils ont été marqués (Zone Cap de Creus, Baléares), après 1.343 jours de liberté. Un thon juvénile marqué en Méditerranée a été récupéré après plus de deux ans de liberté dans la mer Cantabrique. Entre 2008 et 2011, de nombreux cours de formation sur les techniques du marquage conventionnel et électronique ont été dispensés par l'IEO dans divers ports où avaient lieu des tournois et/ou des campagnes de marquage et de remise à l'eau, ce qui a favorisé la participation de la CEPRR à la conception du marquage, unie à l'intérêt stratégique et scientifique, pour le marquage du thon rouge réalisé dans le cadre du Programme GBYP-ICCAT.

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RESUMEN

Durante el periodo 2008-2011 fueron marcados 1.548 ejemplares de túnidos y especies afines por la Confederación Española de Pesca Recreativa Responsable (CEPRR) en coordinación científica con el Instituto Español de Oceanografía (IEO). De esta cantidad, 1.031 atunes rojos fueron marcados con marcas convencionales y otros 10 ejemplares de la misma especie con marcas electrónicas de tipo "pop-up satélite" en el Mediterráneo. Cinco marcas electrónicas pop-up se mantuvieron colocadas en ejemplares adultos durante 110 días. Durante este periodo los ejemplares permanecieron en la zona de marcado a excepción de un ejemplar que alcanzó, en invierno, aguas argelinas. Asimismo, se marcaron 333 atunes blancos y hasta 184 ejemplares de otras especies tales como pez espada, bacoreta, bonito, melva y aguja imperial. Se recapturaron ocho atunes rojos, llegándose a recapturar hasta 3 atunes rojos adultos en la misma zona donde fueron marcados, zona Cap de Creus (Baleares), tras 1.343 días en libertad. Un atún juvenil marcado en el Mediterráneo fue recapturado tras más de dos años de libertad en el Mar Cantábrico. Durante el período 2008-2011 se impartieron numerosos cursillos de formación y adiestramiento en las técnicas del marcado convencional y electrónico por parte del IEO en distintos puertos donde se celebraron campeonatos y/o jornadas de marcado y suelta, lo que ha propiciado la inclusión de la CEPRR en el diseño de marcado para el marcado de atún rojo del Programa GBYP-ICCAT, unido al interés estratégico y científico.

KEYWORDS

Tagging, conventional tags, electronic tags

1. Background

Tagging and recapture activities have been a very useful method for researching the stock structure and migration patterns of bluefin tuna amongst other species.

The Scientific Committee (SCRS) of the International Commission for the Conservation of the Atlantic Tuna (ICCAT) includes conventional and electronic tagging in its research recommendations.

The Spanish Confederation of Responsible Maritime Recreational Fishing (CEPRR), in agreement with and under the scientific coordination of the Spanish Institute of Oceanography (IEO) has been developing a tagging and release programme for bluefin tuna and other species since 2008 (de la Serna and Godoy Garrido, 2009; Godoy, et al 2010; Ortiz de Zárate and Barreiro, 2010).

Tagging is a tool used for studying stock structure and migratory patterns, as well as for knowing the variability in the space-time distribution of different species. It is also used for studies on growth, mortality and abundance. The tags used can be conventional or electronic. The electronic ones can be either "pop-up satellite tags" or internal archival tags.

An important number of scientific tagging activities and campaigns have taken place in the Mediterranean. Totally, more than 13,000 bluefin tuna have been tagged in these scientific campaigns. However, the recapture rate amounts to just 5% of all tagged specimens.

Tagging has allowed gaining some more knowledge on the migratory patterns of bluefin tuna, especially of juveniles (Rey, Cort, de la Serna...)

For its part, recreational fishing has gained a great qualitative importance over the last years and has collaborated in tagging many species of all sizes, all year around and in different areas.

2. Material and methods

Tagging campaigns as well as capture, tagging and release competitions organized by the Spanish Confederation of Responsible Maritime Recreational Fishing under the names "*Desafío Mediterráneo" (*Mediterranean

challenge) and "*Master*" of Roses, among others. Training courses by the IEO are aimed at the participants in tagging campaigns and tagging-release activities.

The specimens were caught with trolling lines and/or hand lines (*brumeo*) in the different occasions. In order to tag young bluefin tuna specimens, fish were extracted from the sea. Tagging cradles were used. In the case of adult bluefin tuna, tagging was usually done without extracting the fish from the water and by using a harpoon.

Conventional ICCAT "*spaghetti*" type tags were applied, together with electronic "pop-up satellite" and "internal archival" tags, by using the respective specific applicators and by taking all the necessary aseptic and antibiotic measures.

The young specimens tagged were sampled and their fork length was obtained (LH cm). In the case of the adult tuna which could not be sampled, the approximate live weight was registered. Similarly, the data on the capture, tagging and release situation were registered, together with the kind of gear used and other info.
Processing of the tagging-recapture data and submission to ICCAT.

3. Results

3.1 Conventional tags

During the 2008-2011 period, 1031 specimens of bluefin tuna were tagged with conventional tags (**Table 1** and **Figure 1**). For the time being, 8 samples have been recaptured (**Tables 2 and 3**), as most tagged specimens were juveniles with lengths below the minimum size established for the species (30 kg). Nonetheless, a 53 LH cm-long and 3.1 kg-weight bluefin tuna, which had been tagged in the Mediterranean (40º 06` N, 02º 48`E) on 28/07/06, was recaptured in the Cantabrian Sea (44º 02`N y 02º51`W) two years later, with a length of 96 LH cm and 15.5 kg, which further confirms the migratory pattern already established by other authors (Cort and Rey 1985).

In the case of long-finned tuna, 333 samples were tagged **(Figure 2)** and one was recaptured. The length distribution of the captured, tagged and released specimens does not have the same juvenile length range that can be observed in professional captures, which clearly shows that the trolling line is more selective than the surface longline. A specimen which had been tagged off the coast of Valencia was recaptured in the south of Menorca.

Likewise, the tagging of some specimens of little tunny, *bonito* and frigate tuna will provide very valuable information to ICCAT's Scientific Committee and will help us gain more knowledge about the space-time distribution of these species, as well as their stock structure and migratory patterns within an ecosystemic approach.

3.2 Electronic tags

As for the 10 electronic pop-up tags placed by the masters of CEPRR's boats in the tagging campaigns in Pollença and Roses, 5 of them remained put for 71 days on average, with a minimum of 38 days and a maximum of 110. It must be pointed out that over those periods the tagged tuna stayed in the tagging area, with the exception of one tuna which, almost in winter, reached Algerian waters. After a certain time, some specimens moved to other areas without leaving the Western Mediterranean, which could mean that they do not belong to the contingent which, after spawning in the Balearics area, heads to the Atlantic Ocean through the Strait of Gibraltar in July and part of August (Rodríguez Roda, 1964). It is more likely that the specimens which remain in the western Mediterranean after spawning belong to a resident Mediterranean subpopulation (De Metrio et al, 2005).

As a summary of the observations we must point out that even if the early release of some tags does not allow us to establish solid behaviour patterns, we can draw some preliminary conclusions.

The fish were tagged after spawning and they remained in the tagging area after that, that is, in the area between the Balearic Islands, the peninsular coast and the limit waters of the Gulf of Leon, which seems to be a temporary residence and feeding area. Three adult specimens were recaptured two and almost three years after they were tagged and released in the same area, respectively **(Figure 3)**.

Acknowledgements

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Table 1. Number of tagged in the 2008-2011 period.

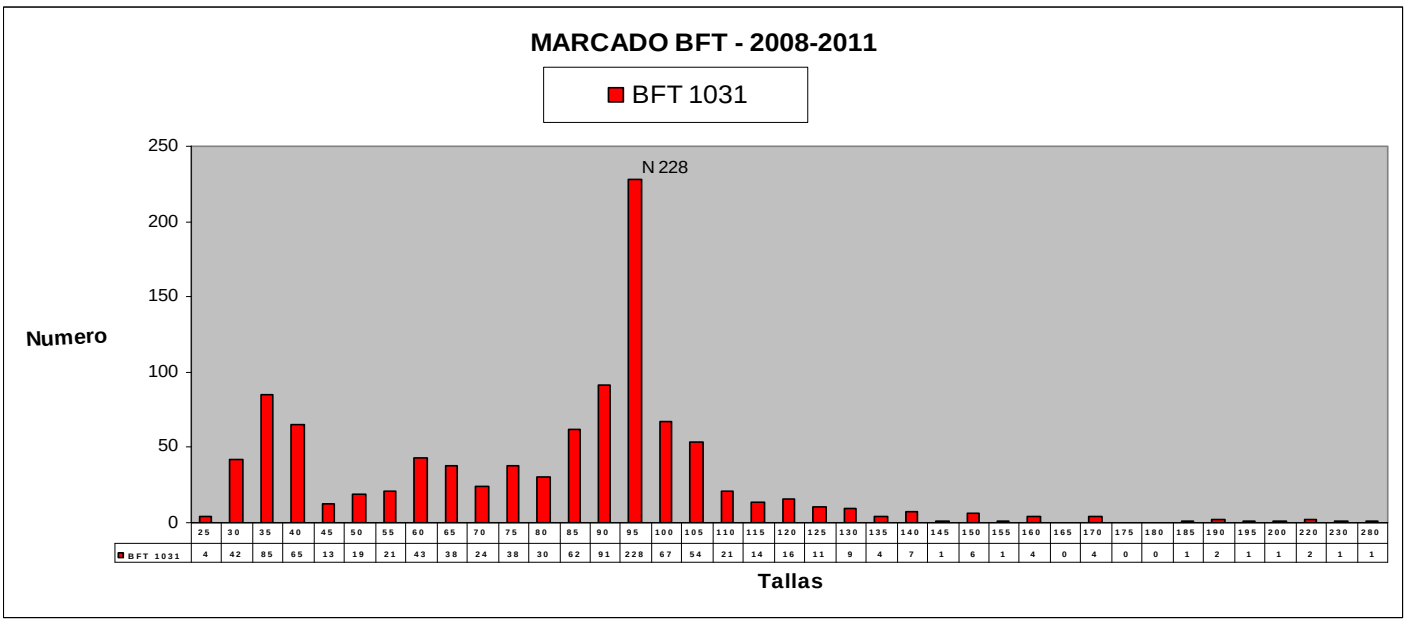
Año	*BFT*	*ALB*	*SWO*	*Otras especies*
2008	176	27		
2009	318	178	1	157
2010	427	90	1	22
2011	110	38		3

Table 2. List of specimens of different species marked by CEPRR that were recaptured.

Nº Marca	*Espec.*	*Fecha marcado*	*Situación marcado*	*Talla cm-CFL*	*Talla cm-LH*	*Barco*
ES00772	BFT	28-jul-06	40º06´N, 2º48 É	54 cm*	51 cm	Denton
CT15449	BFT	2-dic-06	39º08´N,05º30´E		70 cm	LLHB
TN08908	BFT	1-dic-07	40º45N 02º17E		95 cm	Campaña Ancapema
TN07666	ALB	29-jun-08	39º21´N, 0º23´E	92 cm	88 cm	Olap
AAA003331	BFT	3-oct-09	Norte de Mallorca	93cm	89 cm	CEPR
AAA002976	LTA	3-oct-09	40º 53' N, 1º 01' E	35 cm	33 cm	CEPR
AAA03330	LTA	3-oct-09	40º 53' N, 1º 01' E	35 cm	33 cm	SANMA
00059	BFT	30-ago-08	42º09´N, 3º41´E	73 cm	70 cm	Campeonato Roses
ES11574	BFT	9-sep-09	42º20´N, 03º20´E	147cm	141cm	ESTEL
TN 08779	BFT	20-sep-08	41º14'N, 1º54'E	148cm	142 cm	Kuilou
SEC 00 1392	BON	2-oct-10	40º58´N, 1º07É	41 cm	39 cm	Montse
CT 15320	BFT	26-ago-011	42º20´N, 03º20´E	170cm	163 cm	Kuilou
SEC001276	BFT	4-sep-10	41º50´N, 03º45´E	97cm	93 cm	Favela Chic

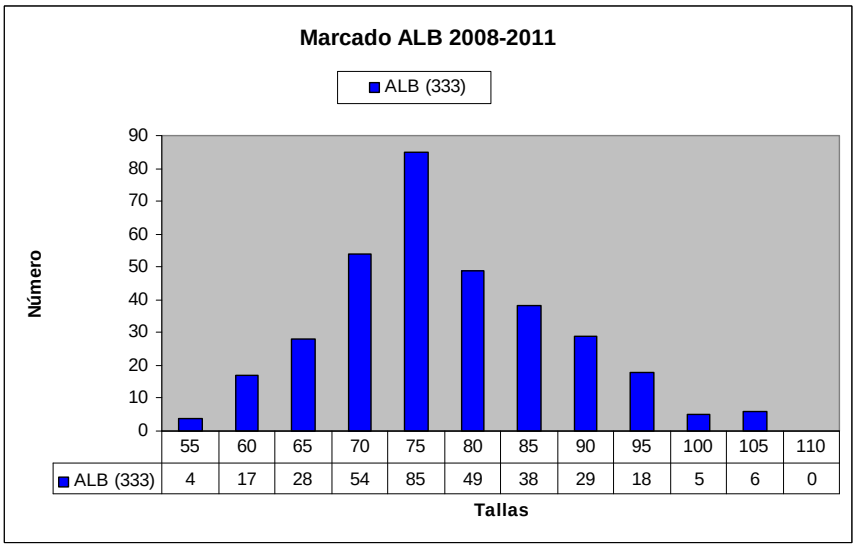
Table 3.-Summary of data from recaptures of tagged by CEPRR.

Nº Marca	*Espec*	*Fecha recaptura*	*Situación recaptura*	*Talla cm LH*	*Nº de Días*	*Barco*
ES00772	BFT	5-sep-08	44º2´N, 2º51´W	91 cm*	770	Profesional
TN07666	ALB	22-ago-08	39º27´N, 4º16´E	92 cm	60	Ancapema (profesional)
AAA002976	LTA	29-oct-09	40º29´20 00º45´8	35 cm	26	Lolita (palangrillo)
AAA03330	LTA	26-oct-09	40º 53' N, 1º 01' E	35 cm	23	Servulo (palangrillo)
00059	BFT	26-sep-2009	41º01´N, 02º45´E	93.4 cm	390	Profesional
AAA003331	BFT	27-jul-10	Sur de Mallorca	93 cm	285	Profesional
CT15449	BFT	16-ago-10	Sur de Francia	111 cm	1343	Recreativo Frances
TN08908	BFT	02-ago-10	Sur Baleares	125 cm	975	Ancapema(profesional)
SEC 00 1392	BON	8-feb-11	41º09´N,01º28É	43 cm	128	Profesional Torredembarra
ES11574	BFT	2-sep-11	42º20´N, 03º20´E	177 cm	723	Mojito
TN 08779	BFT	20-ago-11	42º20´N, 03º20´E	187 cm	1075	Kuilou
CT 15320	BFT	4-sep-09	42º20´N, 03º20´E	163 cm	8	Estel
SEC001276	BFT	21-may-11	43º56´N, 08º28´E	94 cm	273	LLHB-Profesional



	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	220	230	280
BFT 1031	4	42	85	65	13	19	21	43	38	24	38	30	62	91	228	67	54	21	14	16	11	9	4	7	1	6	1	4	0	4	0	0	1	2	1	1	2	1	1

Figure 1. Size distribution of bluefin tuna tagged during the period 2008-2011.



	55	60	65	70	75	80	85	90	95	100	105	110
ALB (333)	4	17	28	54	85	49	38	29	18	5	6	0

Figure 2. Size distribution of albacore CEPRR marked by the period 2008-2011.

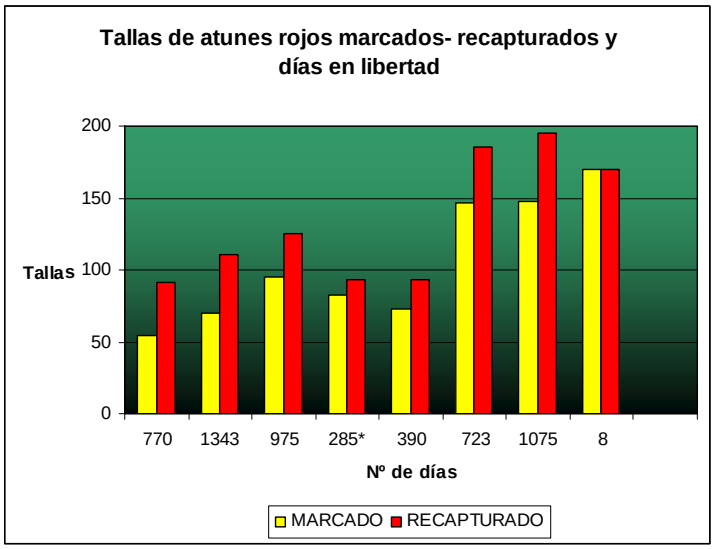


Figure 3. Size distribution of bluefin tuna tagged / recaptured.

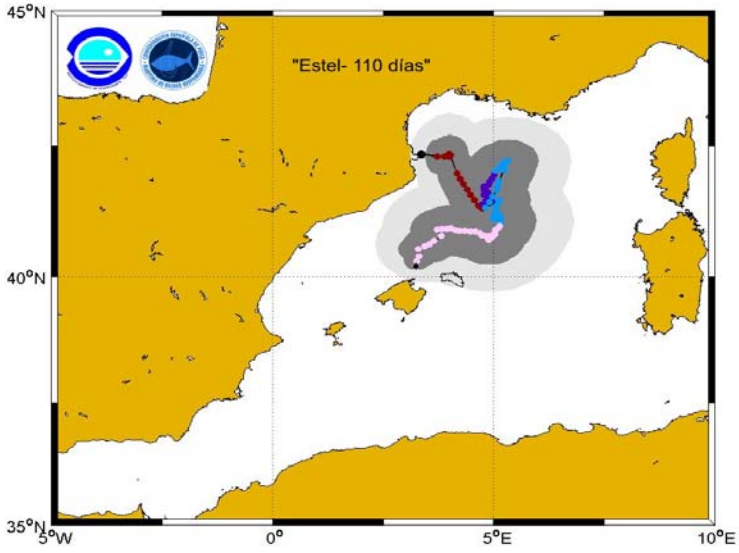


Figure 4. Marked bluefin Cap de Creus (Baleares) to pop-up and recaptured after 723 days and released again in the same area.